FINANCIAL MARKETS AND INSTITUTIONS

RISK MANAGEMENT, DERIVATIVES AND HEDGING

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Prof. Alberto Dreassi – adreassi@units.it

DEAMS
University of Trieste

AGENDA

- Credit and interest rate risk management in financial institutions
- Main features and structures of derivatives
- Using derivatives for hedging purposes

CREDIT RISK

- Almost all intermediaries deal with lending money
- Adverse selection and moral hazard limit profitability
- Managing credit risk involves various activities:
  - **Screening/monitoring**: developing expertise in specific borrowers, manage information and applying judgment to rate borrowers, enforce sound covenants
  - **Relationships**: easier screening/monitoring for long-term clients but this is beneficial also for borrowers (reducing moral hazard), using tools such as loan commitments
  - **Collateral**: increases recovery rates, signals past value creation and reduces moral hazard (f.i. compensating balances)
  - **Rationing**: refusing borrowers or reducing the amount lent
  - **Hedging** or **transferring** default risk

INTEREST RATE RISK

- Asset transformation exposes several intermediaries to IR risk
- Measurement requires focus on rate-sensitive assets and liabilities (**basic income gap analysis**): more assets mean losses from IR decreases (and vice versa)

$$\Delta\text{Income} = \left[A(i) - L(i)\right] \cdot \Delta i$$

- But some apparently IR insensitive assets and liabilities bear different maturities and IR changes can be asymmetric: **maturity bucket analysis**

$$\Delta\text{Income} = \sum_{t=h}^{n} \Delta\text{Income}_t \left[A_{<t} - L_{<t}\right] \cdot \Delta i_{<t}$$

- But management requires views on effects of IR on firm's value: **duration gap analysis**

INTEREST RATE RISK

- Duration: useful for small changes in IR

$$\%\Delta P = \frac{P_{t+1} - P_t}{P_t} \approx -DUR \cdot \frac{\Delta i}{1+i}$$

- Duration gap analysis: calculation of DUR for all assets and liabilities and then using its additivity to derive firm's duration gap on its market value

$$DUR_{GAP} = \overline{DUR}_A - \frac{L}{A} \cdot \overline{DUR}_L$$

- Still, duration gap **requires parallel shifts** of IR on all maturities and essentially **flat IR curves**
- More sophisticated RM tools require models and computational capacity (stress/scenario testing, Value-at-Risk, …)
- Gap immunisation can be costly (without derivatives)

DERIVATIVES, HEDGING AND RISK MANAGEMENT

- Hedging protects from risk by entering a **transaction that offsets** the unwanted current exposure: long Vs. short
- **Micro-hedging** involves one security's risk, **macro-hedging** the overall risk of a portfolio, **cross-hedging** involves similar but not matching transactions
- Hedging can be achieved more efficiently with derivatives:
  - Contracts with limited or no initial investment
  - Settled at a future date
  - Whose value depends on an external variable (underlying)
- Main hedging strategies with derivatives involve: **forward** and **future** contracts, **options**, **swaps** and **credit derivatives**

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Forward contracts

- Two parties agree on settling a specific transaction (stock, bond, IR, index, …) at a specific future date at a fixed price
- Since these are OTC contracts, finding counterparties is difficult due to differences in expectations and exposures
- Forwards are illiquid and expose to credit risk
- When these contracts became standardised and traded more extensively in exchanges (or through dealers), *futures* were born:
  - clearing houses absorb credit risk through day-by-day margin requirements
  - constant negotiability and hedge-of-hedges provide liquidity,
  - standardisation and extension of underlying deliverables allow increases in market's volumes

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Options

- Plain-vanilla: a party buys the faculty/right to buy (call) or sell (put) the underlying at a specific price (exercise/strike) within (American) or at (European) a specific future date from a counterparty (writer), paying a premium
- Examples include stock options but also futures options
- Some features can be changed leading to "exotic" options (f.i. basket, Asian, path-dependent, …)
- Require stable investment (premium) compared to volatile margins of futures
- Faculty instead of obligation for buyers

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Swaps

- Each party pays to the other a specific stream of payments at specific intervals within maturity date
- Typically, the two streams differ for currency (f.i. € Vs. $) or IR (f.i. variable Vs. fixed) underlying streams
- Practically, the two parties exchange the net balance of the opposite streams
- More complications derive from future swaps and swaptions
- Advantages involve IR sensitivity transformation of assets or liabilities without their settlement and long term maturities
- Since OTC, they are more illiquid and exposed to credit risk but potentially tailor-made

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Credit derivatives

- Credit options do not differ from “regular” options
- Credit swaps have, as underlying, revenues or costs from different sources (f.i. loans in different market sectors) but otherwise are similar
- Credit-default-swaps (CDS) are not exactly swaps (but are not insurance either):
  - Buyer pays a fixed premium (usually annuitised)
  - In exchange of a payment made from the seller after a trigger event (f.i. bankruptcy, downgrade, …) involving a third party
- Credit-linked notes are a regular bond plus the option, triggered by a specific event, to alter (usually lower) coupon payments